

[02885/86]

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant(s) : Martin VORBACH et al.
Serial No. : 10/501,845
Filed : August 26, 2005
For : RECONFIGURABLE GENERAL PURPOSE
PROCESSOR HAVING TIME RESTRICTED
CONFIGURATIONS
Examiner : Keith E. Vicary
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I hereby certify that this correspondence is being electronically transmitted to the United States Patent and Trademark Office via the Office electronic filing system on *May 19, 2009*.

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AMENDMENT

SIR:

This paper addresses the Office Action of November 19, 2008. Applicants hereby respectfully request a **three-month extension of time** in which to respond to the Office Action dated November 19, 2008 for which a response period expiring on February 19, 2009 was set. The extended period expires on **May 19, 2009**. Please charge the **\$555.00** (small entity) extension fee to a credit card. If there are any additional fees associated with this paper, please charge Kenyon & Kenyon LLP's Deposit Account No. **11-0600**.

Initially, please amend the above-captioned application without prejudice as follows:

Amendments to the Claims are found in the listing of claims, which begins on page 2 of this paper.

Remarks begin on page 5 of this paper.

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1-6. (Canceled).

7. (Currently Amended) A method of data processing using a processor comprising a reconfigurable field of data processing cells and a register, wherein the register has a data stream memory ~~operated~~ designed as a FIFO ~~vector~~ memory to store at least one ~~[[of a]] data stream and parts of the data stream~~ vector, the method comprising:

providing a program corresponding to a sequence of compilable high-level language instructions;

determining, for the reconfigurable field of data processing cells, a set of configurations by execution of which the program is run ~~, wherein each of the configurations is handled as a single instruction;~~

determining, for each configuration, a respective maximum allowed execution runtime prior to lapse of which the respective configuration is uninterruptible;

executing the configurations; and

during the executing:

storing, in the data stream memory, at least one of the data stream and parts of the data stream; and

for each configuration, monitoring the respective maximum allowed execution runtime in order to interrupt the configuration if the respective maximum allowed execution runtime is exceeded.

8. (Previously Presented) The method as recited in claim 7, further comprising:

using at least one of: i) a register allocation device to allocate the register, and ii) a register releasing device to release the register.

9. (Previously Presented) The method as recited in claim 8, wherein the register allocation device is preserved over multiple reconfigurations of the reconfigurable field of data processing cells.

10. (Previously Presented) The method as recited in claim 7, wherein the register is a RAM PAE.

11. (Previously Presented) The method as recited in claim 7, wherein the program includes a multitask application, the method further comprising:

using the register:

to provide read and write access when a virtual FIFO dividing line is implemented; and

for execution of at least one of two different tasks of the multitask application.

12. (Previously Presented) The method as recited in claim 7, further comprising:
using at least one memory unit as a stack and to indicate at least one of a stack underflow state and a stack overflow state.

13. (Previously Presented) The method as recited in claim 12, wherein the at least one of the underflow state and overflow state is of an operating system unit.

14. (Canceled).

15. (Previously Presented) The method as recited in claim 7, wherein a watchdog is used to recognize an exceedance of each respective maximum allowed execution runtime.

16. (Previously Presented) The method as recited in claim 15, wherein any one of the configurations that exceeds its respective maximum allowed execution runtime is treated as illegal.

17. (Previously Presented) The method as recited in claim 7, wherein any one of the configurations that exceeds its respective maximum allowed execution runtime is treated as illegal.

18. (Canceled).

19. (Currently Amended) The method as recited in claim 7, wherein ~~the handling of the configurations as the single instructions is directly by an operating system~~ performs a predefined step in response to an exceedance by a configuration of the configuration's maximum allowed execution runtime.

20. (Previously Presented) The method as recited in claim 7, wherein at least one of the configurations calls another of the configurations as a sub-routine.

21. (Currently Amended) The method as recited in claim 15, wherein a signal of the watchdog signal initiates a system trap.

22. (Currently Amended) The method as recited in claim 21, wherein, in response to the system trap, is handled by an operating system performs steps defined for a response to ~~[[as]]~~ an invalid ~~illegal~~ instruction.

REMARKS

I. Introduction

Claims 7 to 13, 15 to 17, and 19 to 22 are currently pending in the present application. In view of the foregoing amendments and following remarks, it is respectfully submitted that all of the presently pending claims are allowable, and reconsideration is respectfully requested.

II. Rejection of Claims 7 to 13, 15 to 17, and 19 to 22 Under 35 U.S.C. § 112, ¶ 1

Claims 7 to 13, 15 to 17, and 19 to 22 were rejected under 35 U.S.C. § 112, ¶ 1 as assertedly failing to comply with the written description requirement. While Applicants do not necessarily agree with the merits of this rejection, to facilitate matters, claims 7, 19, and 22 have been amended herein thereby obviating the present rejection. Support for the amendments to the claims may be found in the specification, e.g., at page 8, lines 13 to 26; and page 10, lines 23 to 31. Withdrawal of this written description rejection is therefore respectfully requested.

III. Rejection of Claims 7 to 13, 15 to 17, and 19 to 22 Under 35 U.S.C. § 112, ¶ 2

Claims 7 to 13, 15 to 17, and 19 to 22 were rejected under 35 U.S.C. § 112, ¶ 2 as assertedly indefinite. While Applicants do not necessarily agree with the merits of this rejection, to facilitate matters, claims 7, 19, 21, and 22 have been amended herein thereby obviating the present rejection. Withdrawal of this indefiniteness rejection is therefore respectfully requested.

IV. Rejection of Claims 7 to 10, 15 to 17, and 19 to 22 Under 35 U.S.C. § 103(a)

Claims 7 to 10, 15 to 17, and 19 to 22 were rejected under 35 U.S.C. § 103(a) as unpatentable over the combination of U.S. Patent No. 6,658,564 (“Smith et al.”), U.S. Patent No. 5,941,977 (“Panwar et al.”), and U.S. Patent No. 6,374,286 (“Gee et al.”). It is respectfully submitted that the combination of Smith et al., Panwar et al., and Gee et al. does not render unpatentable any of claims 7 to 10, 15 to 17, and 19 to 22 for at least the following reasons.

To reject a claim under 35 U.S.C. § 103(a), the Office bears the initial burden of presenting a *prima facie* case of obviousness. *In re Rijckaert*, 9 F.3d 1531, 1532, 28 U.S.P.Q.2d 1955, 1956 (Fed. Cir. 1993). To establish *prima facie* obviousness, three criteria must be satisfied.

First, there must be some suggestion or motivation to modify or combine reference teachings. *In re Fine*, 837 F.2d 1071, 5 U.S.P.Q.2d 1596 (Fed. Cir. 1988). This teaching or suggestion to make the claimed combination must be found in the prior art and not based on the application disclosure. *In re Vaeck*, 947 F.2d 488, 20 U.S.P.Q.2d 1438 (Fed. Cir. 1991). As clearly indicated by the Supreme Court, it is “important to identify a reason that would have prompted a person of ordinary skill in the relevant field to combine the [prior art] elements” in the manner claimed. *See KSR Int’l Co. v. Teleflex, Inc.*, 127 S. Ct. 1727 (2007). In this regard, the Supreme Court further noted that “rejections on obviousness cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness.” *Id.*, at 1396.

Second, there must be a reasonable expectation of success. *In re Merck & Co., Inc.*, 800 F.2d 1091, 231 U.S.P.Q. 375 (Fed. Cir. 1986).

Third, the prior art reference(s) must teach or suggest all of the claim features. *In re Royka*, 490 F.2d 981, 180 U.S.P.Q. 580 (C.C.P.A. 1974).

As explained herein, the Office Action does satisfy these requirements of either of §§ 102 and 103 as to all of the features of the claims.

Claim 7, as presented, relates to a method of data processing using a processor including a reconfigurable field of data processing cells and a register, wherein the register has a data stream memory operated as a FIFO memory to store at least one data vector, and recites the following:

. . . providing a program corresponding to a sequence of compilable high-level language instructions;
determining, for the reconfigurable field of data processing cells, a set of configurations by execution of which the program is run;
determining, for each configuration, a respective maximum allowed execution runtime prior to lapse of which the respective configuration is uninterruptible;
executing the configurations; and
during the executing:
storing, in the data stream memory, at least one of the data stream and parts of the data stream; and
for each configuration, monitoring the respective maximum allowed execution runtime in order to interrupt the configuration if the respective maximum allowed execution runtime is exceeded.

With respect to the feature of storing a data stream in a data stream memory during the executing of configurations, the Office Action asserts that Smith et al. at column 4, lines 22 to 33 discloses this feature. Claim 7 has been clarified to indicate that the data

stream memory is one operated as a FIFO memory. Smith et al., on the other hand, merely refer generally to random-access memory devices.

Further, claim 7 provides that there is a respective maximum allowed execution runtime for each configuration. **None of the cited references, whether considered alone or in combination, discloses or suggests this feature.** The Office Action admits that Smith et al. do not disclose this feature and refers instead to Gee et al. as assertedly disclosing this feature. However, Gee et al. refer to operating multiple Java Virtual Machines (JVMs) in separate time slices (partitions) on a single processor, where one master JVM controls the transfers between different JVMs. A JVM represents a bundling of instructions to which a time slice is assigned.

Accordingly, Gee et al. merely provide for a maximum allotted time for a set of instructions. Gee et al. do not disclose or suggest a maximum allotted time for a configuration. A configuration is of a function and/or interconnection of units *for* their use to execute instructions. At most, the cited art suggests a maximum allotted time for one or more instructions themselves, for which there may be a configuration. With the setting of a maximum allotted time for an instruction or instruction set to which a configuration corresponds, the cited art does not suggest that there should also be set a maximum allotted time for the corresponding configuration. The cited art does not suggest contemplation of any need or benefit to such an additional or substitute maximum allotted time.

In the “Response to Arguments” section, the Office Action asserts that the general concept of not allowing indefinite running of a slice is applicable to configurations just as it is to instructions. However, the argument assumes that the slices of Gee et al. are comparable to configurations, which they are not. As indicated above, configurations are *for* execution of instructions, so that the suggestion of a maximum allotted time for instructions would not further suggest a maximum allotted time to configurations which are for and correspond to those same instructions to which the maximum allotted time is already suggested to be set. Use of allotted maximum time to the configuration itself, whether in addition to or instead of one for the corresponding instructions, and/or its benefit has not been contemplated by the prior art, so that any such suggestion by the present Office Action is necessarily based on improper hindsight reasoning based on Applicants’ disclosure.

Moreover, the Office Action has **not provided any support for the proposition that there was a reasonable expectation of success** for modifying the features of Gee et al. to apply a maximum allotted time to a configuration just as it does to a JVM. For example, the present application resolves a conflict which arises by it being highly preferable, on the one

hand, to have configurations that run as long as possible due to lower configuration overhead, whereas, on the other hand, it is preferred to have a fast interrupt response time. One solution referred to in the present application is to provide vector memories into which a data stream or parts thereof may be stored during execution, which may allow for fast interrupt response times while it is possible to have configurations that need to run a very long time. Further, the present application discusses how to handle loops if a maximum time is allotted to a configuration. The cited art does not contemplate the application of a maximum time allotted to a configuration, and therefore also does not contemplate whether it is feasible or how it is feasible.

Panwar et al. do not correct these critical deficiencies of the combination of Smith et al. and Gee et al. For all of the foregoing reasons, the combination of Smith et al., Panwar et al., and Gee et al. does not disclose or suggest all of the features recited in claim 7, as presented, so that the combination of Smith et al., Panwar et al., and Gee et al. does not render unpatentable claim 7.

Claims 8 to 10, 15 to 17, and 19 to 22 ultimately depend from claim 7 and are therefore allowable for at least the same reasons set forth above in support of the patentability of claim 7. *In re Fine*, 837 F.2d 1071, 5 U.S.P.Q.2d 1596 (Fed. Cir. 1988) (any dependent claim that depends from a non-obvious independent claim is non-obvious).

Withdrawal of this obviousness rejection of claims 7 to 10, 15 to 17, and 19 to 22 is therefore respectfully requested.

V. Rejection of Claim 11 Under 35 U.S.C. § 103(a)

Claim 11 was rejected under 35 U.S.C. § 103(a) as unpatentable over the combination of Smith et al., Panwar et al., Gee et al., and U.S. Patent No. 5,860,119 (“Dockser”). It is respectfully submitted that the combination of Smith et al., Panwar et al., Gee et al., and Dockser does not render unpatentable the present claims for at least the following reasons.

Claim 11 depends from claim 7 and is therefore allowable for at least the same reasons set forth above in support of the patentability of claim 7 since Dockser does not cure the critical deficiencies noted above with respect to the combination of Smith et al., Panwar et al., and Gee et al.

Withdrawal of this obviousness rejection of claim 11 is therefore respectfully requested.

VI. Rejection of Claims 12 and 13 Under 35 U.S.C. § 103(a)

Claims 12 and 13 were rejected under 35 U.S.C. § 103(a) as unpatentable over the combination of Smith et al., Panwar et al., Gee et al., and U.S. Patent No. 4,041,462 (“Davis et al.”). It is respectfully submitted that the combination of Smith et al., Panwar et al., Gee et al., and Davis et al. does not render unpatentable either of claims 12 and 13 for at least the following reasons.

Claims 12 and 13 ultimately depend from claim 7 and are therefore allowable for at least the same reasons set forth above in support of the patentability of claim 7 since Davis et al. do not cure the critical deficiencies noted above with respect to the combination of Smith et al., Panwar et al., and Gee et al.

Withdrawal of this obviousness rejection of claims 12 and 13 is therefore respectfully requested.

VII. Conclusion

In light of the foregoing, it is respectfully submitted that all of the presently pending claims are in condition for allowance. Prompt reconsideration and allowance of the present application are therefore earnestly solicited.

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Respectfully submitted,

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